

## New LCA Theses

### A Multi-Stakeholder Abridged Environmentally Conscious Design Approach

Thesis for the degree of Doctor of Philosophy

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Environmental concerns play an increasingly important role in product design. As these concerns have mounted, so have academic and industrial research efforts into ways to reduce the environmental impact of products through approaches such as Environmentally Conscious Design (ECD). Existing research has not yet sought to understand the role of stakeholders in ECD. New ECD approaches and techniques will have to be able to adapt and interface effectively with various stakeholders in the design and development process and throughout the life cycle of a product to ensure that both single and multiple life cycle issues are considered. They will need to be able to assist in selecting a suitable life cycle strategy, analyzing designs and suggesting possible improvement methods. An exploratory multi-method research approach was chosen which involved the use of numerous qualitative and quantitative methods including surveys (questionnaires and informal interviews), industrial case studies and a focus group. The research explored the role of stakeholders in ECD, and developed a new methodology for integration of a novel stakeholder 'body of knowledge' through an abridged life cycle approach. It showed how ECD relies on the close co-operation and input of many different stakeholders both within and external to a company. The 'body of knowledge', a set of criteria representative of stakeholder views and opinions, had been gathered from a range of stakeholders over the life cycle of a number of electromechanical products and their packaging. The 'body of knowledge' is of global benefit with the data and weightings having the potential to be modified for

different products. It also has the potential to be continually updated through consultation with other stakeholders and further case studies. The approach is based on an analyze-report-prioritize-improve framework and utilizes a clearly defined step-by-step procedure for assessing, scoring and subsequently reducing, the environmental impacts of products with single or multiple life cycles. It uses techniques such as life cycle strategy worksheets, flow diagrams, and matrices, with predetermined environmental categories, profiling, tailor-made guidelines and checklists. The approach contains an in-built mechanism for incorporating stakeholder requirements and strategies in the process. The paper-based 'Multi-Stakeholder Abridged ECD Approach' is quick and easy to use and of immediate value to the company with stakeholder participation and co-operation the key to its success. It ensures that multi-criteria value judgements are not based on an individual assessor, but a group of stakeholders, the Life Cycle Team members, who participate at predetermined stages of the ECD process. The data is generalized for a range of electromechanical products. The approach can be implemented as part of a Green Concurrent Engineering process, for re-designing an electromechanical product and its packaging or comparing alternative designs.

In summary, in fulfilling the research needs the thesis presents an original contribution to knowledge in the field of ECD through the development and validation of a novel abridged ECD approach. The thesis also identifies areas of further work that will increase the knowledge base, scope and applicability of the work carried out.

## Research Projects

### Sustainable Product Design: Two major studies published on State of the Art in the EU and Dissemination to SMEs

As a support to the development of an Integrated Product Policy (IPP) in the EU, a number of leading institutes in the field have produced 2 major reports on sustainable product development (SPD) in Europe. The consortium consisted of TNO-STB (NL), the TNO/TU Delft Ecodesign Centre Kathalys (NL), VITO (B), the Centre for Sustainable Design (UK), VDI (D), DTU (Dk). The work was commissioned by the EU's Institute for Prospective Technological Studies in Sevilla, Spain (IPTS).

The first study (400 pages) is called 'Ecodesign: European State of the Art'. Fifteen country studies make an inventory and analysis per EU member state with regard to *method development*, *dissemination*, and *education* (supply side oriented) and *practical application* (demand side oriented). A structured, qualitative indicator system (based on so called 'maturity profiles') was developed that were used to obtain a judgement of a set of (inter)national experts per country on each element. To get additional insight in practical application, an inquiry to the Fortune 500 companies was performed. A cross-country analysis provides insight about the state of the art in the front runner countries, and gives suggestions which priorities exist with regard to improving method development, dis-

semination, education and practical application. The study is available from [www.jrc.es](http://www.jrc.es), or:

- Main report:  
<ftp://ftp.jrc.es/pub/EURdoc/eur19583en.pdf>
- Part II (country- and other support studies):  
<ftp://ftp.jrc.es/pub/EURdoc/sps00140.pdf>

The second study (300 pages) is called 'Ecodesign – Strategies for dissemination to SMEs'. The study contains a theoretical part about bottlenecks and driving factors for implementing environmental measures like SPD in SMEs. Furthermore, in 15 country studies for the EU member states it is analysed which support programmes are available that could be used to disseminate ecodesign knowledge to SMEs. On this basis, policy implications for improving dissemination of SPD to SME's are given. The study is available from [www.jrc.es](http://www.jrc.es), or:

- Main report:  
<ftp://ftp.jrc.es/pub/EURdoc/eur19740en.pdf>
- Part II (country- and other support studies):  
<ftp://ftp.jrc.es/pub/EURdoc/sps00139.pdf>

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